

**REMARKS**

Upon entry of the foregoing amendments, claims 1-33 are pending in the application. All the claims have been amended to clarify the inventive subject matter. The specification has been amended to include the proper section headers, and also to include the text of the claims as originally filed. The amendments do not introduce any new matter within the meaning of 35 U.S.C. §132. Therefore, entry of the amendments is respectfully requested.

**CLAIM OBJECTIONS**

The Examiner has objected to claims 2-6, 9, 11-14, 16-24, and 27-29 as containing various terms as not in compliance with U.S. practice. The claims have been amended to remove the terms noted by the Examiner. Therefore, the bases for the objections have been removed thereby rendering the objections moot.

Accordingly Applicants respectfully request the Examiner reconsider and withdraw these objections.

**CLAIM REJECTIONS UNDER 35 U.S.C. §112, 2D PARAGRAPH**

The Examiner has rejected claims 8, 10, 14, 17, 18, 25 and 27-33 under 35 U.S.C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

Specifically, claims 8, 10, and 32 are rejected based on various phrases which are alleged to render the claims indefinite. For the sake of forwarding the prosecution of this application, Applicants have amended the claims to remove the terms indicated by the Examiner, i.e., "various alkanols, "the wished percentage", "between", and "state of the art". As such, the bases for these rejections have been removed.

Claims 17, 18, and 27-33 are rejected for reciting a use of the claimed subject matter without reciting any method or process steps. Applicants have amended the claims in question to remedy this, and as such the bases for these rejections have been removed.

Accordingly, the bases for the rejections under 35 U.S.C. §112, second paragraph has been removed, and the Examiner is respectfully requested to withdraw these rejections to the claims.

**CLAIM REJECTION UNDER 35 U.S.C. §101**

The Examiner has rejected claims 17, 18, and 27-33 are rejected for reciting a use of the claimed subject matter without reciting any method or process steps. Applicants have amended the claims in question to remedy this, and as such the basis for this rejection has been removed.

Accordingly, with the basis for the rejection under 35 U.S.C. §101 being removed, and the Examiner is respectfully requested to withdraw this rejection to the claims.

CLAIM REJECTIONS UNDER 35 U.S.C. §102

**Rejection under 35 U.S.C. §102(a)**

The Examiner has rejected claims 1-33 as being anticipated by Bauer et al. (WO 03/077340 A3 and U.S. Patent No. 7,108,935). Applicants respectfully traverse this rejection.

Bauer et al. fail to anticipate the instantly claimed subject matter, because the reference fails to teach each and every limitation of the claimed subject matter.

The instant subject matter is directed to a precursor **solution** of layer zirconium phosphate sulfoarylenephosphonate, which is an organic solution wherein all the chemical components of this compound are present at the same time and from which this compound can be obtained after the solvent evaporates. Specifically, the claimed precursor solution contains only chemical species of the zirconium phosphate sulfoarylenephosphonate, which are converted into the final product only after solvent evaporation. It should also be noted that the layered compound, once formed, is then insoluble in all other organic solvents.

As presently claimed, the precursor solution according to the instant claims is an organic solution containing metal(IV) salts and oxoacids of phosphorus from which, after evaporation of the solvent, insoluble compounds of general composition  $M(IV)(O_3P-G)_{2-n}(O_3P--R^1--X)_n$  can be

obtained, where M(IV) is a tetravalent metal, -G is a generic inorganic or organic group, --R<sup>1</sup>-- is an organic group, --X is an acid group and n is a coefficient ranging from 0 to 1.5.

Turning to the teachings of Bauer et al., Applicants respectfully submit that the organic precursor solution of the instant claims is not taught. Specifically, Bauer et al. teach a **colloidal dispersion**, rather than the solution as instantly claimed. This dispersion contains particles of the pre-formed zirconium phosphate sulfoarylenephosphonate. However, the claimed precursor solution contains only chemical species of the zirconium phosphate sulfoarylenephosphonate, which are converted into the final product only after solvent evaporation.

Thus the two procedures lead to the formation of filler particles deriving from different sources and possessing different morphology and distribution. This, in turn, results in different types of composite membranes.

On these bases, Applicants respectfully submit that Bauer et al. fails to teach each and every limitation of the instant subject matter, and as such the rejection under 35 U.S.C. §102(a) based on Bauer et al. is improper. Therefore, Applicants respectfully request the Examiner to reconsider and withdraw the rejection.

**Rejection under 35 U.S.C. §102(a)**

The Examiner has rejected claims 1-6 as being anticipated by Alberti et al. (U.S. Patent No. 5,892,080). Applicants respectfully traverse this rejection.

Alberti et al. fail to anticipate the instantly claimed subject matter, because the reference fails to teach each and every limitation of the claimed subject matter.

The claimed subject matter is discussed above with respect to Bauer et al. and is not repeated here for the sake of compactness of prosecution, but the remarks are incorporated herein by reference in their entirety.

Alberti et al. teach mesoporous solids obtained by reaction between a solution containing a mixture of di-phosphonic and phosphorous acids and a solution containing the tetravalent metal M(IV) and hydrofluoric acid. Alberti et al. do not teach a solution according to the instant subject matter.

First, the compounds of Alberti et al. have a structure and composition completely different from the zirconium phosphate sulfoarylenephosphonate. The former contains diphosphonate groups which confer a pillared structure to the solid. However, the latter, according to the instant subject matter, contains sulfoarylenemonophosphonate groups which confer a layered

structure and protonic conductions.

Secondly, no precursor solutions have been used to prepare the pillared compounds of Alberti et al. The organic solution the Examiner has cited, i.e., dioxane, clearly refers to solutions diphosphonic acids, which are soluble in many organic solvents.

Finally, the organic solution of Alberti et al., i.e., dioxane, does not contain tetravalent metal, and therefore it cannot be considered a precursor solution. The product obtained from evaporation of the solvent is the diphosphonic acid before solubilized and not the insoluble M(IV) diphosphonate. Furthermore, the use of this solution is not in the preparation of the pillared compound, but it is used to modify the surface composition of preformed M(VI) phosphonate by topotactic exchange.

As such, Alberti et al. fail to teach the organic solution as presently claimed, as well as the synthetic route leading to the M(IV) phosphonate as presently claimed.

On these bases, Applicants respectfully submit that Bauer et al. fails to teach each and every limitation of the instant subject matter, and as such the rejection under 35 U.S.C. §102(a) based on Alberti et al. is improper. Therefore, Applicants respectfully request the Examiner to reconsider and withdraw the rejection.

**Rejection under 35 U.S.C. §102(b)**

The Examiner has rejected claims 1-33 as being anticipated by Grot et al. (U.S. Patent No. 5,919,583). Applicants respectfully traverse this rejection.

Grot et al. fail to anticipate the instantly claimed subject matter, because the reference fails to teach each and every limitation of the claimed subject matter.

The claimed subject matter is discussed above with respect to Bauer et al. and is not repeated here for the sake of compactness of prosecution, but the remarks are incorporated herein by reference in their entirety.

Grot et al. teach that zirconium hydrogen phosphate can be precipitated in a pre-formed perfluorinated sulfonic acid polymer through a two step process. First, the **preformed membrane** is soaked in an aqueous solution containing zirconium ions. Next the membrane is further soaked in a solution of phosphoric acid.

As such, Grot et al. clearly do not teach a membrane containing the inorganic filler that is not preformed. The **composite membrane** of the instant claims is prepared by casting a solution of the perfluorinated sulfonic acid polymer and a solution containing the tetravalent metal and the phosphonic acids. Both the polymeric film and the inorganic filler are formed simultaneously during the evaporation of the solvent. This is not taught by Grot et al., since Grot teaches the use of a preformed membrane.



As such, Grot et al. fail to teach the composite membrane of as presently claimed.

On these bases, Applicants respectfully submit that Grot et al. fails to teach each and every limitation of the instant subject matter, and as such the rejection under 35 U.S.C. §102(a) based on Grot et al. is improper. Therefore, Applicants respectfully request the Examiner to reconsider and withdraw the rejection.

**CONCLUSION**

In view of the foregoing, Applicants respectfully submit that all claims pending in the application are novel and in condition for allowance. Therefore, Applicants respectfully request the Examiner to allow all claims pending in this application.

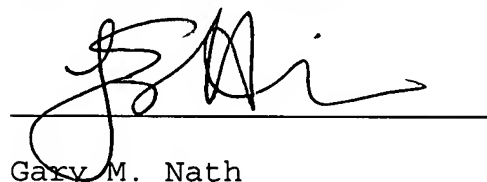
If the Examiner has any questions or wishes to discuss this matter, the Examiner is welcomed to telephone the undersigned attorney.

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**THE NATH LAW GROUP**  
112 S. West Street  
Alexandria, VA 22314  
Tel: (703) 548-6284  
Fax: (703) 683-8396

Respectfully submitted,

**THE NATH LAW GROUP**

A handwritten signature in black ink, appearing to read 'GM Nath', is written over a horizontal line.

Gary M. Nath  
Reg. No. 26,965  
Tanya E. Harkins  
Reg. No. 52,993  
Customer No. 20529